HISTOPATHOLOGY OF NAIL DISEASES

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The difficulties encountered in attempting to delineate the accurate diagnosis in nail dyscrasias are well known. Where the glabrous skin is involved in a cutaneous syndrome, the nail condition is assumed to be part of the same disorder. Practically all textbook descriptions are based on this assumption except in fungous infections where the fungi may be found on microscopic examination or where a positive culture has been obtained. Naturally, local causes as contacts, growths and injuries, as well as congenital defects present clinical aberrations.

Microscopic examination was made of the nails of 44 patients consecutively observed from whom sufficient material could be secured to be adequate for such purposes.

The biopsy specimens were secured from nails in which the clinical diagnosis was established. In these 44 cases, the clinical diagnoses were: onychomycosis in 17; contact onychitis in 16; psoriasis in 8; seborrheic dermatitis in 1; lichen pilaris seu spinulosis in 1; and an injury of the nail in 1. A congenital case, clinically pachyonychia congenita, had a microscopic picture similar to lichen pilaris seu spinulosis.

In those instances in which the gross changes in the nails were irregularly distributed, several representative specimens were obtained. In all 44 cases the nail clippings were placed in 10% formalin, dehydrated in alcohol and xylol, and embedded in paraffin. The sections were routinely stained with hematoxylin and eosin. Where indicated, sections were also stained by Gram's method. Biopsies from 6 individuals with grossly normal nails were used as controls. All sections were graded as to the degree of: nail plate thickening; subungual keratinization; presence of shrunken nuclei diffusely scattered and in clusters within the keratin; presence of cyst-like spaces within the keratin; presence of bacteria within keratin and nail plate; presence of fungi (spore and hyphae); and debris in nail plate. Degrees of such involvement are presented on the chart on page 122.

RESUME OF FINDINGS

The microscopic sections of 44 cases with diseases of the nails were carefully studied. The histologic findings are quite similar in psoriasis and fungous infections. In psoriasis the changes include increased thickness of the nail plate, groups of nuclei and cystic spaces in subungual keratin. In fungous infections the changes are similar except that the fungi can usually be demonstrated, and

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Histologic findings (Resume)

DIAGNOSIS	NO. OF CASES	NAIL PLATE THICKNESS		SUBUNGUAL KERATIN		GROUPS OF NUCLEI	SCATTERED NUCLEI	CYST-LIKE SPACES	BACTERIA IN KERATIN	BACTERIA IN NAIL PLATE	FUNGI		DEBRIS IN NAIL PLATE
		Inc.	N	Inc.	N						Spores	Hyphae	
Contact Onychitis	16	+ 16		+ 16		0	4	0	+++ 14	++ 6	0		++ 7
Onychomycosis	15	++ 15		++ 15		++ 15	+ 2	++ 15	++ 1	+ 3	11-4		0
Psoriasis	8	++ 8		+++ 8		++++ 8	++ 8	++++ 8	+ 6	0	0		+ 5
Traumatic	2		Atrophy 2		2	0	0	0	0	0	0		0
Congenital	2	++++ 2		++++ 2		++ 2	+ 2	0	0	0	0		0
Seborrheic dermatitis	1	+ 1		+ 1			+ 1						

the groups of nuclei and cystic spaces in the subungual layer are less prominent. The finding of bacteria in the nail plate suggests the presence of bacterial infectious onychitis. Cocci were also found in some cases of contact onychitis. The microscopic features of conditions of the nails have been studied, but none have been sufficiently distinctive to be considered pathognomonic. Cases of onychitis venenata have been examined but the findings are not diagnostic.

DISCUSSION

Pardo-Castello (1) points out the difficulty of studying the microscopic changes in ungual and periungual lesions as it is almost impossible to obtain permission for biopsies. Even when the patient consents to the removal of a small piece of tissue for diagnosis, the results may be unsatisfactory. It is, of course, impractical to completely examine the nail plate, its matrix and its bed because this would necessitate removal of the distal portion of the finger with the entire phalanx followed by decalcification of the bone. In the few cases in which he was able to obtain cadaver specimens, the results of his investigations led him to believe that in most nail dystrophies, the matrix increase or decrease in function is responsible for the clinical changes. The matrix in exaggerated function produces excessive nail tissue; the matrix in diminished activity gives rise to irregular formation of nail plate substance and possibly to loss of normal correlation between the growth of the nail and that of its bed. The formation

of distorted or excessive function of the matrix, which results in the same changes seen in parakeratosis and hyperkeratosis of the skin. Separation of the nail plate from its bed causes the latter to grow into a corneous mass, which clinically constitutes the so-called hyperkeratosis subungualis. In this condition, as in others the exact mechanism of this process is unknown. When excessive function of the matrix occurs and the correlation between the growth of the plate and that of the bed is maintained, the result is enlargement of the nail organ *in toto* (pachyonychia).

There are very few articles in the literature which deal with the microscopic study of nails. The most comprehensive report is that recently published by Felix Sagher (2). He recorded the microscopic changes in 55 nails of 14 patients with onychomycosis. Scrapings of these 55 nails had given 41 positive findings on microscopic examination in potassium hydroxide, and 7 positive results on cultural examination. Fungi were detected in the microscopic sections of 32 of the 55 nails. The most significant result of this work was that T. violaceum was present in the superficial layers of the nail plate; T. purpureum chiefly in the deepest layers, sometimes in the middle layers, but never in the superficial layers of the nail plate; masses of spores of T. purpureum could be seen in the subungual keratin. The conclusion from these findings was that only in cases of T. purpureum is surgical treatment indicated; while T. violaceum infections should respond more readily to local therapy.

Sulzberger and Baer's (3) fine discussion sums up the salient parts of Sagher's paper and it is quoted herewith:

> These beautiful studies by Sagher may serve to explain why certain forms of onychomycotic infections are relatively easy to eradicate and tend to heal spontaneously whereas others are extremely difficult to cure and tend to recur even after evulsion. Certain species of fungi invade only the top of the nail plate and some practically lie on the top; others, like T. purpureum, grow deep in the nail plate and even in horny processes penetrating the nail bed. Though the causes of these species-specific differing proclivities are unknown, it is logical to conclude that on mechanical grounds along the fungi growing nearer the plate surface would be easier to reach and remove or destroy. Sagher's approach by histopathologic technics opens a promising avenue to further study of the many forms of diseases of the nails.

Alkiewicz (4) studied the microscopic changes in two types of psoriasis of the nails: punctata and leucopathica. The paraonychosis was demonstrated to be an analogous process to the parakeratosis of psoriasis of the glabrous skin. Imperfectly formed cells with elongated and easily stained nuclei and cytoplasm containing stainable elements (paraonychotic cells) were found. These cells were arranged in layers separated from each other by numerous air fissures and these layers formed wavy lines bent towards the base of the nail. Numerous keratohyalin cells were found in the neighborhood of the paraonychotic focus.

SUMMARY

In a study of the nails taken from 44 patients, the findings on microscopic examination showed that fungous diseases and probably psoriasis present a

rather typical picture. Where a contact onychitis was the cause of gross changes in the nail, the microscopic changes were in no way characteristic.

This is a preliminary report of investigations in progress which, it is hoped, may ultimately lead to the establishment of recognizable microscopic changes characteristic of different diseases of the nails.

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